

**A. Complaints About the ATSC DTV Standard by Some in the Computer Industry Are Unfounded**

In sharp contrast to the nearly universal support for the proposed standard among broadcasters, consumer equipment manufacturers, and the other parties who have the most direct interest in broadcast television and who have labored for almost a decade in the Advisory Committee process, some members of the computer industry, led by CICATS, mount an all-out assault on the ATSC DTV Standard, making almost any claim, no matter how distorted, in a futile attempt to discredit the standard and the historic process that led to its creation. The Commission, as the creator and leader of the Advisory Committee process, with its staff carefully monitoring the work over the years, will be just as offended as the industry participants by some of the baseless accusations and irresponsible counterproposals. These reply comments and undoubtedly the reply comments of other participants in the Advisory Committee process will show conclusively that these complaints are unfounded and that the Commission can proceed swiftly and confidently to adopt the proposed standard.

CICATS (at 5) claims that the Advisory Committee recommendation would stifle innovation, and hurt the national economy and the competitiveness of U.S. firms nationwide. Saying that government-mandated standards are often the product of political compromise and interest group politics, rather than thorough and unbiased analysis, CICATS (at 7) calls the Advisory Committee process a textbook example of this phenomenon, producing a proposed standard that is flatly inconsistent with the convergence of computers and televisions.

This claim is demonstrably false, and an insult to the hundreds of industry volunteers who labored mightily in dozens of industry specialist groups to specify requirements for a DTV system and then exhaustively and thoroughly evaluated and tested competing proposals. The constant goal of each of these groups and the only basis for including or excluding aspects of the standard was the technical merit of a proposal, i.e., the extent to which it would satisfy clearly defined criteria designed to provide the best possible advanced

broadcast television service, including easy interoperability with other media, including computers and telecommunications. And while "convergence of computers and televisions" was not an explicit goal of the effort, nor should it have been, no less than three of the clearly defined objectives for the standard were directly focused on ensuring the greatest possible compatibility and interoperability with computers and telecommunications, and the proposed ATSC DTV Standard undeniably offers *unmatched interoperability* as compared to any other television system on the planet.

What CICATS is really saying in this comment and many others like it, is that the Advisory Committee did not develop a standard designed exclusively for computers.<sup>12</sup> However, the principal goal of the Advisory Committee was to develop a standard that would bring quantum improvements to terrestrial broadcast television service in a manner that consumers would find attractive, including the ability to provide a host of innovative information services beyond traditional television services. The proposed standard was carefully designed to be inclusive in order to meet the needs of many constituencies, including the computer industry. As we've stated before, the proposed standard is immeasurably better because of the efforts of some in the computer industry to ensure that their needs were met. To characterize the efforts of the Advisory Committee to be inclusive of the needs of different industries as "political compromise and interest group politics" is a gross and intentionally misleading distortion. The broad industry consensus in support of the proposed standard speaks volumes about the integrity of the process, as reflected by the

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<sup>12</sup>CICATS true motives are exposed when they state (at 27) that "CICATS does not contend that computers *cannot* perform the functions required to accommodate [interlaced scanning, non-square pixel spacing, slow picture rates]; but accommodating them will needlessly increase the cost, and impair the performance, of the computer industry's DTV-related products and services. . . . And the computer and software industries' ability to compete with incumbent receiver manufacturers -- for whom the DTV standard was tailored -- will be impaired." (emphasis in original) This is a clear attempt by CICATS to manipulate the market by convincing the Commission to mandate progressive scan only -- and thereby to mandate away low-cost competition from established receiver manufacturers, rather than to let the free market work to choose among various interlaced and progressive formats in the ATSC standard.

adoption of the Advisory Committee's final report *without a single negative vote*, even from members of the computer industry.<sup>13</sup>

CICATS (at *iii*, 5) and some of its members find great fault with the Advisory Committee proposal, including interoperability issues that we will address in later sections of these comments, but the greatest flaw, they claim, is that the proposed standard unnecessarily boosts broadcaster and consumer costs by forcing them to leap beyond SDTV to more expensive HDTV, denying consumers any role in choosing. They claim the aggregate cost to consumers over a seven-year period would be \$91 billion, whereas implementing a CICATS counterproposal to implement SDTV would only cost \$44 billion, saving consumers almost \$50 billion.

The CICATS estimates are grossly in error, and they imply that the costs are forced on the American consumers. To the contrary, consumers will have a choice, and performance decisions will be made in the marketplace under the Advisory Committee proposal. Indeed, it is the CICATS proposal that would restrict options made available to consumers.

As shown in detail in the August 12, 1996 Reply Comments of Thomson Consumer Electronics, CICATS bases its unit price figures on completely erroneous assumptions and then uses a totally unrealistic consumer purchase forecast to create large aggregate numbers that it expects will impress the Commission. Moreover, Appendix A to these reply comments develops reliable parts-cost estimates of both ATSC receivers and receivers based on the CICATS proposal, and demonstrates conclusively that from a consumer's point of view it would be foolish not to provide full HDTV capability in the transmission standard as well as the ability for receivers to decode all ATSC formats, from day one.

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<sup>13</sup>CICATS (at 1, fn. 1) is mistaken in saying that both Advisory Committee members representing the computer industry abstained in the vote. The representative of Digital Equipment Corporation confirms that she cast an affirmative vote. Microsoft (at 4 ) indicates that its representative abstained.

But even apart from the gross errors in CICATS' cost estimates, they are comparing apples and oranges -- their cost of providing SDTV against the ATSC Standard's cost of providing both SDTV and HDTV. Consumers could have saved billions by buying black and white televisions instead of color televisions, but that hardly argues for limiting ourselves to a black and white television standard. More important, CICATS' cavalier treatment of HDTV gets to the heart of the matter and clearly identifies two key fallacies that underlie their complaints about the standard.

If the Commission adopts a standard, CICATS (at 32-33) counterproposes a "mere refinement" to the Advisory Committee standard. They propose a single 480-line progressive scan baseline format, with unspecified aspect ratios and temporal layering for variable frame rates, and a layering technique they claim would allow broadcasters to provide resolutions comparable in quality to the highest resolution formats in the Advisory Committee standard. Under their proposal, only the baseline format would be part of the standard, but they indicate that individual broadcasters could layer MPEG-2 data to add HDTV into the bit stream if demand existed.<sup>14</sup>

In this comment the first key fallacy of the CICATS counterproposal is starkly revealed. *Broadcasters must make an assessment of what their viewers will demand and what level of quality they must provide in order to remain competitive with other video delivery media, and they must make that assessment before adopting a standard and before implementing DTV.* Broadcasters made that assessment years ago, and demanded that top-quality HDTV be provided on day one by any system proposed as the basis for a new standard. Moreover, the Commission long ago made a clear decision to incorporate full HDTV in the standard it would adopt unless that proved technically impossible. As we

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<sup>14</sup>See CICATS Technical Proposal exhibit at 4. "We differ from the [Advisory Committee] proposal in that we do not require that higher resolutions be standardized at this time. We feel it is premature to do so, and that the market does not yet support higher resolutions such as the interlaced 1920x1080 [Advisory Committee] format." They add that in a few years higher resolutions will become cost effective and can be implemented should the market then demand it.

explained at length in our comments and reply comments on the Fourth NPRM, HDTV is and should be the centerpiece application of DTV service. HDTV is what consumers want and what broadcasters must provide in order to remain competitive in the future.<sup>15</sup> It is characteristic of the complaints raised by these members of the computer industry that they remain so completely oblivious to the needs of broadcasters in this endeavor, and it is telling that 91 broadcasters and broadcast organizations gave a ringing endorsement of the ATSC DTV Standard, while not a single broadcaster in the country has embraced the CICATS counterproposal.<sup>16,17</sup>

*The second key fallacy underlying these complaints is the mistaken notion that the ability to decode all of the ATSC DTV formats, including the HDTV formats, will make receivers prohibitively expensive for most consumers. As discussed below and in detail in Appendix A, the costs of receivers will be lower using the ATSC DTV Standard than under the layered approach CICATS advocates, for both SDTV-quality low-end displays and HDTV-quality high-end displays.*

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<sup>15</sup>CICATS, fond as it is of quoting every negative statement William Schreiber ever made about the proposed standard, evidently overlooked his view (Vol. I at 7) that it is vital to include HDTV from day one, in order to motivate consumers to make the transition to digital television. CICATS also ignores the admonition of the Clinton Administration's Information Infrastructure Task Force flowing out of the 1994 government/industry Advanced Digital Video Workshop, saying that the Advisory Committee/Grand Alliance proposal for HDTV is the best available alternative -- "superior to . . . incrementally deploying a system that involves digitizing today's television signals, but not changing the fundamental picture formats and other technical parameters of the current broadcasting infrastructure." CICATS also ignores the benefits of deploying high-resolution displays used for HDTV for improving the NII. See Grand Alliance Fourth NPRM Reply Comments at 39, *Workshop on Advanced Digital Video in the National Information Infrastructure*, NISTIR 5457, Georgetown University, May 10-11, 1994, and *Advanced Digital Video and the National Information Infrastructure*, Report of the Information Infrastructure Task Force, Committee on Applications and Technology, Technology Policy Working Group, February 15, 1995.

<sup>16</sup>There is no chance of an industry consensus forming around any proposal that does not deliver proven HDTV performance from day one. CICATS (at 40) accuses the Grand Alliance of saying it's necessary to force broadcasters to transmit HDTV in order to force consumers to purchase more expensive HDTV sets. As "proof" of this accusation, they quote our statements favoring minimum amounts of HDTV programming in order to ensure the early and frequent availability of high-definition programs which will encourage consumers to purchase HDTV sets. This kind of deliberate distortion is typical of the voluminous CICATS comments.

<sup>17</sup>CICATS (at 33-34) claims that unlike the Advisory Committee's "supply push" approach, their proposal is based on "demand pull" where consumers' tastes will guide the industry in adopting higher resolutions. But how would consumers ever express a desire for HDTV? Which manufacturer would offer the first HDTV receiver that could receive no broadcasts? And which consumer would buy this useless receiver? What would motivate any broadcaster to begin broadcasting in HDTV to zero viewers?

CICATS (at 18, 28, 30) rants and raves about the Advisory Committee's ACATS proposal to support 18 formats<sup>18</sup>, saying it will cost consumers tens of billions more per year, will result in inferior products, will limit high-value growth, will restrict development of advanced applications,<sup>19</sup> and that it appears to have been designed to guarantee huge financial rewards for TV receiver manufacturers.

All of these claims are wrong, and the last one, in particular, is an uninformed, irresponsible charge as the Commission who has shepherded this process knows full well. Broadcasters and equipment manufacturers and everyone else involved in the Advisory Committee process have fought hard at every turn to develop a system that keeps costs as low as possible, because all of us know that getting prices down is vital in order to stimulate massive consumer demand. HDTV is the main goal of the Grand Alliance system upon which the ATSC Standard is based, and the ability to support other formats as well at almost negligible additional cost is vital to the standard's ability to address multiple needs. Moreover, effective techniques have already been demonstrated by Hitachi America,<sup>20</sup> and others are being developed, to process all of the DTV formats, including the HDTV formats, with a cost-reduced decoder that can deliver lower-definition, lower cost receivers and converters.

Moreover, careful scrutiny of the CICATS Technical Description appendix (at 7-9) shows that their own proposal does not have only one format as they claim. They propose a

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<sup>18</sup>Several parties express dismay over the supposed great complexity inherent in decoding 18 different formats. In fact, there are really only three fundamentally different formats -- 1080, 720, and 480 vertical lines. The number eighteen comes by counting each combination of frame rate and aspect ratio associated with these vertical line rates as a different format.

<sup>19</sup>CICATS (at 41) quotes the comments of Bove, *et al*, (filed early) faulting the Grand Alliance system for supposedly overconstraining future technological advances, saying these MIT researchers were intimately involved in the Advisory Committee process and made their criticism "despite their work with the Grand Alliance." Some of these individuals were peripherally involved in the Advisory Committee process, but none of them has played any role in the Grand Alliance. Indeed, they include a disclaimer that none of them is currently involved in MIT's Advanced Television Research Program.

<sup>20</sup>Hitachi America (at 8-9) explains that "[i]n order to meet the needs of set-top decoders for existing receivers and to provide a variety of price points, a low-cost all-format decoder is necessary. . . . [Hitachi America] hopes that its public demonstrations have helped establish the existence of an effective all-format decoding technology."

reference decoder that accommodates variable aspect ratios and decodes any format up to 1024 x 512, at frame rates that include 24, 36 and 72 Hz. This means that far more formats and frame rates must be accommodated by a CICATS receiver than an ATSC receiver -- hardly the single format that they claim while lambasting the ATSC standard for being "unnecessarily complex and detailed"! (CICATS at 28)<sup>21</sup>

CICATS (at 35) presents a false Hobson's choice, saying consumers must either pay too much for an all-format receiver or risk not getting programming sent in higher resolution formats. CICATS should be relieved to learn that there is a strong consensus that all DTV receivers should and will decode all formats, and that they can do so economically for both low-resolution and high-resolution displays. As discussed later in these reply comments, no one, except possibly CICATS, opposes providing all-format capability in receivers.

CICATS (at 39, 41) claims that Advisory Committee receivers and set-top boxes will need four to five times more memory and processing speed than the CICATS baseline format which will provide equal or better quality than Advisory Committee, i.e., ATSC, SDTV. CICATS puts forward cost comparisons, focusing first and foremost on set-top converters and then on receivers, concluding that the CICATS proposal offers dramatically lower costs than the ATSC Standard.

First, as discussed above, CICATS is evaluating the wrong question. Broadcasters demand HDTV capability on day one in any standard, and CICATS offers no cost estimates for high-definition receivers in their proposal. Indeed, their focus on 1996 converter prices demonstrates their preoccupation with SDTV, not HDTV. Under an HDTV-focused transition plan, the initial prices of receivers and how rapidly those prices can be expected to decline are key benchmarks, while the prices of converters become relevant as the *end* of the transition approaches.

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<sup>21</sup>Examples of valid CICATS formats include 640 x 480, 656 x 480, 672 x 480, . . . 1024 x 480, as well as 640 x 512, 656 x 512, 672 x 512, . . . 1024 x 512. These combinations alone number 48 different formats, not even counting CICATS' three frame rates.

Second, CICATS numbers are wrong, in any event, because they completely ignore the fact that memory and processing costs can be substantially reduced entirely within the ATSC standard, decoding *all* ATSC formats, using approaches such as one that has been developed and demonstrated to the Commission and the public by Hitachi America. Indeed, in Appendix A to these reply comments we offer a detailed and careful receiver cost analysis which includes estimates for four ATSC receivers spanning a simple representative DTV product line. We also develop similar estimates for the CICATS baseline receiver and for a CICATS HDTV receiver, and compare the ATSC and CICATS receiver costs. Our analysis showed the following results, with dollar figures representing parts-costs of the receiver, omitting the costs of the glass tube and the cabinet:

- An ATSC 480-line, interlaced display receiver would cost \$184 in 1996.
- An ATSC 480-line, progressive display receiver would cost \$272 in 1996.
- An ATSC 1080-line , interlaced display receiver would cost \$311 in 1996.
- An ATSC 720-line, progressive display receiver would cost \$365 in 1996.
- A CICATS 480-line, progressive display receiver would cost \$224 in 1996.
- A CICATS 720-line, progressive display receiver would cost \$458 in 1996.

Thus, our cost analysis indicates several key results.<sup>22</sup> Use of an interlaced display provides the lowest cost ATSC or CICATS-based receiver, and the CICATS single-format SDTV (\$224) is only \$48 less than the ATSC SDTV (\$272) that decodes all of the ATSC formats, while the CICATS HDTV (\$458) costs \$93 *more* than the ATSC HDTV (\$365). Moreover, applying Moore's Law (performance improvement by a factor of two every two years) to these costs in order to predict how they might fall, the \$48 difference in the progressive SDTV receiver in 1996 would fall to \$24 in 1998, when early DTV stations would be on the air, would fall to \$6 by 2002, when all commercial stations would be on the air, and would fall to \$3 by 2004, as substantial market penetration occurs. Thus, contrary to

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<sup>22</sup>Our cost estimates for ATSC DTV receivers are largely in agreement with and substantiated by independent receiver cost analyses conducted by the Technical Subgroup of the Advisory Committee.

CICATS' assertions, even assuming progressive scan displays, there is no significant penalty whatsoever for receivers (or converters) in providing the capability to decode all ATSC formats from day one, and for high-end receivers the ATSC standard costs less than the CICATS proposal.

But even making these cost comparisons risks lending undue credibility to the CICATS proposal. The CICATS proposal is just that -- a proposal -- and at a level of development that is far from a proven, implemented and tested system such as the Advisory Committee long ago decided was necessary as the basis for a DTV standard to which the entire industry would convert. Indeed, extensive work in the MPEG standards process and elsewhere has firmly established that layered (embedded) coding is less efficient than direct (simulcast) coding. One of CICATS' own references states "[f]rom the HDTV experiment, it can be concluded with a good accuracy that the quality of the HDTV pictures in an embedded system at 20 Mbit/s is equivalent to the HDTV quality of a simulcast system at 16 Mbit/s. The difference in bitrate, for similar quality, is therefore 20% of the embedded system bitrate."<sup>23</sup> As the Advisory Committee test results demonstrated, a 20 percent penalty in bit rate means a very substantial penalty in picture quality, and it is extremely doubtful that the CICATS proposal, if ever embodied in prototype equipment, could deliver acceptable HDTV picture quality over a 6 MHz channel.<sup>24</sup> Indeed, because of these inefficiencies, it is our

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<sup>23</sup>"A Comparative Study of Simulcast and Hierarchical Coding," J. De Lameillieure and D. Pallavicini, Feb. 1996, European RACE project.

<sup>24</sup>We also understand that the CICATS proposal violates the international MPEG-2 standard in numerous ways. See Reply Comments of ATSC, August 12, 1996. Strict compliance with MPEG-2 is an important characteristic for promoting interoperability and use of the U.S. standard elsewhere in the world. Indeed, one of the changes ordered by the Advisory Committee in the initial Grand Alliance proposal was the elimination of techniques that were not included in MPEG. As Appendix A to the ATSC Reply Comments shows, by prohibiting various frame rates and non-square pixel formats, all of which exist in MPEG and are embodied in currently available video products purchased by consumers, *CICATS receivers and converters would be unable to receive every known bit of digital TV that is currently transmitted in the U.S. via satellite, cable, MMDS, DVD or telephone company video delivery systems.*

understanding that serious development of layered coding approaches has ceased around the world.<sup>25</sup>

Moreover, the CICATS proposal violates the international MPEG-2 standard in numerous ways. Strict compliance with MPEG-2 is vital because it ensures that integrated circuits developed in conformance with the MPEG standard from a variety of suppliers will be able to decode the standard. Thus, compliance with this international standard will help ensure the lowest possible cost for both broadcast and consumer equipment. Conformance with MPEG is also an important characteristic for promoting interoperability and use of the U.S. standard elsewhere in the world. Indeed, one of the changes ordered by the Advisory Committee in the initial Grand Alliance proposal was the elimination of techniques that were not included in MPEG-2.

Appendix A to the August 12, 1996 ATSC Reply Comments reviews these MPEG compliance issues, giving a brief summary of violations of the MPEG standard and some discussion of the consequences. One salient conclusion of even this cursory review is that by prohibiting various frame rates and non-square pixel formats, all of which exist in MPEG and are embodied in currently available video products purchased by consumers, *CICATS receivers and converters would be unable to receive every known bit of digital TV that is currently transmitted in the U.S. via satellite, cable, MMDS, DVD or telephone company video delivery systems.*

As it did with consumer costs, CICATS (at 43-45) makes similarly unreliable cost estimates for broadcast transmission equipment, concluding that broadcasters could save billions in the aggregate if they don't broadcast HDTV. They also claim (at 45, Selwyn appendix) that adoption of the Advisory Committee proposal will cost the public billions more by delaying the return of spectrum, since the transition to DTV under the Advisory

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<sup>25</sup>To argue, as Demos does (at 5) that layered coding is *more* efficient than direct coding, challenges reason. If this were true, wouldn't a 240-line baseline format yield even better results? And wouldn't a 120-line baseline format be even better?

Committee proposal will be much slower than under the CICATS approach with its alleged lower costs.

Of course, broadcasters could save money, in the short term, by not investing in HDTV capability. They also could save billions in the aggregate by ceasing operations, but neither course would preserve free over-the-air television in the years and decades to come, and neither course would be in the public interest. This CICATS comment again shows an utter disregard for the needs of broadcasters to remain competitive in the future. Indeed, we are unaware of any broadcaster who supports the CICATS proposal. And of course, lower costs will indeed spur demand, just as will the superior image quality offered by HDTV, and since the ATSC Standard offers the ability to get superior image quality from day one, with costs as low or lower than under the CICATS approach, adopting the ATSC Standard will minimize the length of the transition.

Never tiring, CICATS (at 46-49) argues that the Advisory Committee standard will adversely affect the competitiveness of the computer and entertainment industries by imposing requirements that limit their compatibility with DTV, saying “it makes no economic sense to penalize two of our country’s most vital industries to reward the handful of electronics manufacturers that dominate the Grand Alliance.”

As demonstrated *infra*, the proposed standard does not limit DTV compatibility with computers, and in any event, the specifications for the standard were developed by the Advisory Committee in a consensus-driven process, and were established principally by broadcasters assessing the needs of their consumer viewers.

CICATS (at 51-57) says the claims of the Grand Alliance about jobs and the economy are flimsy, and that the Advisory Committee standard will stifle growth of the U.S. computer industry, will bring the convergence of television and computers to a screeching halt,<sup>26</sup> will

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<sup>26</sup>CICATS asks the Commission to believe that the convergence of TVs and computers, currently proceeding apace in a world of analog NTSC television, interlaced scan, and non-square pixels, would come to a screeching halt with the introduction of the only digital television system on the planet that uses progressive scan and square pixels predominantly.

eliminate U.S.-based manufacturers from the competition with non-U.S. television manufacturers, may dissuade U.S. computer hardware manufacturers from entering into the PC-TV business, and will threaten the appeal of U.S. films and undercut the motion picture industry.

None of these arguments has any merit, and the hysterical hyperbole of these wild assertions belies their validity. It defies belief to argue that a new broadcast television standard of any kind, much less the most computer-friendly broadcast standard ever devised, could possibly *stifle the growth* of the U.S. computer industry. And the attempt to paint these issues as foreign TV manufacturers vs. American computer makers is completely bogus. First, the standard is driven by the needs of broadcasters and consumers, not manufacturers; second, except for what precious little profit flows to the owners of the highly price competitive U.S. TV manufacturing industry, the industry is thoroughly American;<sup>27</sup> and finally, to the extent that the deployment of broadcast television becomes a catalyst for the convergence of televisions and personal computers, no one doubts the ability of Microsoft and other computer and software companies to compete effectively.

CICATS finally concludes (at 58-60) by saying that it should be obvious that they are committed to using DTV to its fullest potential and to the greatest advantage of the public, and that adopting their approach does not entail reinventing the wheel and would not incur any delay in implementing DTV.

On the contrary, their comments show no focus on or interest in free over-the-air television, HDTV, or the problems of broadcasters. Since broadcasters rightfully insist on a proven, tested system, adopting the CICATS approach would incur years of delay for assessment, development, testing and evaluation of an actual working system, with no real prospect that the resulting system would equal the proven performance of the Grand Alliance system already in hand. Meanwhile, other digital video standards that are far less

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<sup>27</sup>Although this whole discussion ought to be irrelevant, it's worth noting that the vast majority of personal computer monitors are imported from Asia.

interoperable with computers and telecommunications, including DVB, would take root here in the U.S. and throughout the world.

Demos (at 2, 5, 7), the architect of the CICATS counterproposal, in his own lengthy submission, urges the Commission not to adopt the Advisory Committee proposal, saying his firm has developed a better approach that outperforms the Advisory Committee proposal by a substantial margin in every video format. Demos (at 6) urges the Commission to submit his materials to an independent and unbiased outside group for an expert evaluation which he believes could be completed within a few weeks.

As Mr. Demos well knows, the Commission already established a process and procedures for evaluating the claims of system proponents -- its Advisory Committee. Despite his active involvement in the Advisory Committee during the last several years, this system was never proposed to the Advisory Committee and therefore, was never subjected to the rigorous and thorough Advisory Committee processes for certification, evaluation and testing. His claim that an evaluation could be completed within a few weeks is disingenuous. There is no support among broadcasters, the primary users of a terrestrial DTV standard, for any system that does not have proven, tested performance, including top-quality HDTV, and even if there were any reason to believe that the Demos approach could deliver such performance, it would take years, not weeks, to repeat the type of thorough evaluation and testing of prototype equipment that broadcasters require. The Commission has no valid basis for further consideration of Demos' proposal, and certainly none for scrapping the entire Advisory Committee process in favor of these unproven last-minute claims.<sup>28</sup>

Throughout the nine-year Advisory Committee process there has been no shortage of impressive sounding claims about what systems could be devised if only the particular

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<sup>28</sup>Demos (at 2, 7-8) finds fault with almost every aspect of the ATSC DTV Standard, and urges the Commission to adopt a lengthy list of restrictions that go even beyond the CICATS proposals, including a variety of requirements on receivers, something the members of CICATS generally oppose. For instance, he urges the Commission to reject the colorimetry aspects of the Advisory Committee recommendation and to give the task of defining appropriate colorimetry to "a qualified committee."

visionary involved had enough time and money to make the proposal work. Early on, the Advisory Committee determined to use a careful, open process to scrutinize various proposals, relying on peer review by technical experts in a variety of specialists' committees headed by impartial leaders, and to accept only a system with proven, tested performance as the basis of a standard. This process served the involved industries and the public well, yielding breakthrough digital technology and ultimately the world's leading digital television system. There is absolutely no basis for the Commission to depart from this careful process now, based on the fallacious cost estimates and the dubious performance claims surrounding the CICATS proposal. The Commission should reject the CICATS counterproposal.<sup>29</sup>

#### **B. Other Complaints about the Standard Are Also Unfounded**

The Film Makers Coalition (at *i*, 3) endorses the CICATS proposal, including a requirement that broadcasters transmit all films in their original aspect ratios, and along with Robert Primes (at 3, 4), discusses at length their concern about potential cropping of their motion pictures for display on televisions.

We needn't repeat here all of the reasons why a single-format base-line transmission standard should not be adopted. We are puzzled, however, that these members of the motion picture industry speak so passionately about the artistic integrity of their work in the context of potential cropping of their pictures, but seem perfectly willing to forgo high-definition resolution in a transmission standard. With the ATSC DTV Standard, using the 720-line and

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<sup>29</sup>Microsoft, Compaq, CompTIA and BSA generally repeat the same positions reflected in the CICATS Comments, often with the same kind of distortion and hyperbole that characterizes the CICATS submission. Compaq (at *ii*, 15) criticizes the ATSC Standard first for supporting *too many* formats, and then for *not enough* aspect ratios. Intel (at 1-2, 7), although a member of CICATS, takes somewhat more moderate positions. Intel advises against adopting the standard in its entirety, but if the Commission does, it should ensure that the transport system includes the ability to deliver executable code; it should recommend, not require, image formats, and should consider incorporating the CICATS approach; it should allow alternative coding and compression techniques; and it should not regulate receivers beyond ensuring that they don't interfere with each other. Compaq (at 21) and CICATS (at A-12) join Intel in noting the need for ensuring that the transport system includes the ability to deliver executable code, saying that the Commission need not postpone adoption of a standard pending completion of this work. Intel has recently joined ATSC and a representative of Intel chairs a working group within ATSC that has begun work on a supplemental data broadcast standard to meet this need.

the 1080-line progressive scan transmission formats, for the first time in history film makers will have the ability to display something like movie theater spatial resolution on home television screens. Everything they say about the emotional appeal of their content would seem to apply with at least as much force to the resolution of pictures as it does to the aspect ratio. We would expect film makers to be the last people on earth to support the CICATS base-line standard, because it fails to guarantee proven HDTV performance from day one of the transition to digital television.<sup>30</sup>

CFA/MAP (at 2, 6, 8) also endorses the progressive scan base-line standard proposed by CICATS, saying it will reduce the cost of digital receivers and converters and will permit the convergence of video and computer technology. They repeat the erroneous and misleading CICATS cost figures, and parrot back some of the unfounded hyperbole spouted by others, including claims that the Advisory Committee proposal would freeze technology in the 20th century, and that the dispute over the standard is about who gets a monopoly on receivers. As demonstrated above, these claims have no merit.

William Schreiber (Vol. II at 1-3) says that if the Grand Alliance system works as generally expected, it will deliver benefits fully commensurate with the expenditures involved, but that the standard is not perfect: He registers strong objections on some aspects of the standard (discussed *infra*), but other "imperfections" are mentioned more by way of an academic tutorial on his view of the perfect system than as essential changes that must be made. His comments make clear that he knows better than many the importance of ending the designing and getting on with the implementation.

Digital Theater Systems ("DTS") (at 1) argues that the ATSC DTV Standard must not require conformance with Dolby AC-3, saying that the Dolby AC-3 technology is obsolete, is incapable of recreating the artist's intent, and is poised to limit further innovation. DTS (at 4,

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<sup>30</sup>One reason these film makers support the CICATS proposal appears to be their desire to have their movies transmitted in progressive scan. They may not be aware that the Grand Alliance system video encoder contains a feature that automatically detects material originally produced in film and transmits it using the 24 frames per second progressive scan format.

6) finds fault with the Advisory Committee test procedures, says subjective assessments have been conducted that prove better efficiency for its system, and makes a specific alternative proposal, including standardized hardware for an audio decoder. Universal Studios (at 1) supports the proposed standard, but urges that Dolby AC-3 not be permitted exclusively, saying that the DTS system is superior.

Like other claims of superior technology, this proposal comes too late, and its benefits are asserted, not proven. Several other excellent audio systems, including three developed by members of the Grand Alliance, were considered or evaluated as part of the Advisory Committee process, but the Dolby AC-3 audio system was selected as the clear winner by the Advisory Committee. There is no consensus within the industry for opening up the standard to another audio system or to multiple audio systems, and no compelling reason to believe that the present standard is not as good or better than any other.

The totality of these extensive comments on the Advisory Committee's recommendation confirm that the ATSC DTV Standard represents the world's best digital television technology and that it is far more than adequate for the nation's next generation of broadcast television service. A remarkable consensus in favor of the standard exists among those parties directly involved in broadcast television, and the arguments raised against it by parties less directly involved, although voluminous and sometimes extravagant, lack merit and reflect a myopic concern with supposed interoperability difficulties while ignoring the Commission's fundamental objectives in this proceeding. All in all, the comments articulate a compelling case for adopting the ATSC DTV Standard in its entirety, just as the Commission's Advisory Committee has recommended.

#### **IV. The Advisory Committee Process Warrants Adoption of its Recommendation**

Many commenters praise the Advisory Committee process. NTIA (at 2) calls it an open process, to be commended, while ATSC (at *iv*) says the FCC has championed a unique, historic process, an unsurpassed example of effective government/industry cooperation. The

Broadcasters (at 3), Dolby (at 2) and MECA (at 2,7) state that the standard was developed through a uniquely open and inclusive process. Hitachi America (at 3) describes the concerted effort that included representatives of all affected industries, and Sony (at 1) describes the process as fair, open, deliberate, and dedicated to searching out the best solutions. Philips (at v, 12) says the process was perhaps as impressive as the technology it produced, and that the goal was always to get the system that best serves the needs of the American people.

Schreiber (Vol. II at 1, 8) says that although the Advisory Committee has done its job well it has been hampered by the fact that almost all the participants work for companies with a financial interest in the outcome. Saying the public has been inadequately represented, Schreiber urges the Commission to appoint a small panel of independent experts, including FCC staff, to make the final desirable modifications to the system, with the Commission making the ultimate decisions. These experts must have business knowledge of both industries (computer and TV), as well as technical expertise on the matters to be decided, not necessarily in the same individuals, but they must not have any financial interest in the outcome. Primes (at 13) makes a similar suggestion, urging the Commission to delay acceptance of the Advisory Committee proposal until the potential problems he's identified can be verified independently by parties without vested interests in the results.

These suggestions are an affront to the hundreds of volunteers who labored diligently in the Advisory Committee for almost a decade. It is not only necessary, but desirable in such a process to involve all of the parties who have a stake in the outcome, and more often than not, the best experts in a particular field are actually employed by themselves or someone else in that field. The members of the Advisory Committee were chosen by the Commission to represent a broad spectrum of interests and expertise, but proponents of specific systems were not allowed to vote on the recommendation, and impartial leaders who operated fairly and openly were selected for every Advisory Committee working group. And as the comments summarized above indicate, the constant focus of every group within the

Advisory Committee was to achieve a standard that best met the needs of the public. Between the Advisory Committee and the Commission's own review in this docket, all of the bases are covered to ensure that the Commission's decision is in the public interest.

CFA/MAP (at 1) laments that the Advisory Committee didn't include even one member of the public (even though the subcommittees and working parties were open to all interested parties).<sup>31</sup> All of the thousand or so participants in the Advisory Committee process are members of the public, TV viewers, and consumers. Moreover, the consistent focus of the whole process was to develop the best system possible whereby broadcasters could provide the most useful and attractive services to the viewing public through the most effective and affordable consumer equipment possible.

Demos (at 2) says that the Advisory Committee remained insular to his input, and didn't accept his ideas and that "the participants who developed the ATSC DTV proposal were a relatively closed group who did not cooperate with those outside of their group" (25), that "the Advisory Committee testing process at the ATTC was neither thorough nor appropriate for the digital television systems" (14), that "the Advisory Committee process never established any process or mechanism for working to adjust the Grand Alliance proposal" (16), and that "the Grand Alliance proposal remains unmodified since it was originally proposed in mid-1993." (16)

Although Demos has been a long-standing participant in the Advisory Committee process, he never proposed a system to the Advisory Committee. That his specific suggestions may not always have been adopted says more about the merits of his ideas than about the fairness of the process, since virtually every other participant in the process attests to the openness and fairness of the process. We will not dignify all of his erroneous

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<sup>31</sup>CFA/MAP complains about being excluded from the Advisory Committee process, yet they have embraced a completely unproven proposal formulated by a few computer companies behind closed doors with no input at all from the public or from other interested stakeholders. As a consequence, they have repeated false claims and endorsed unsound technical proposals that would actually harm consumers. The checks and balances inherent in the peer review-oriented Advisory Committee process would have prevented this kind of mistake.

statements with a response, but we will address some of the outright falsehoods. From its own monitoring of the Advisory Committee process, the Commission knows that the standard was in no way established by a relatively closed group. Contrary to his assertion, the Advisory Committee established an elaborate set of specialist groups within its Technical Subgroup to evaluate every detail of the Grand Alliance proposal, and the Advisory Committee required significant changes in the Grand Alliance system as a result, e.g., the requirement to increase the 960-line formats to 1080 vertical lines, the requirement to use only square-pixel formats for HDTV, and the requirement to modify the system to conform strictly to the international MPEG-2 standard for video compression. The Advisory Committee also played a key role in the final selection of the transmission sub-system, including consideration of a potential alternative system, and in the final selection of the audio system.

Demos can hardly expect the Commission or anyone else who knows the truth about the Advisory Committee process to believe his unsubstantiated technical claims, when he so flagrantly misrepresents the process itself.

The Advisory Committee performed an invaluable service for the Commission and for the industries involved by forging a strong consensus over the course of nearly a decade for an advanced television transmission standard. By virtually all accounts, the process was remarkably open, thorough, fair and successful. Such a consensus cannot be lightly ignored or cast aside, but should guide the Commission's final decisions in this manner. The excellence and integrity of the Advisory Committee process fully warrants the Commission's acceptance of its recommendation. Accordingly, the Commission should act swiftly to adopt the ATSC DTV Standard recommended by the Advisory Committee.

**V. The Commission Should Rely on Existing Processes in Making Modifications to the Standard**

In our initial comments, we stated our strong belief that a sunset provision on the mandatory use of the ATSC DTV Standard is completely unnecessary and would undermine the Commission's goal to promote a smooth and swift transition. Every other party who addressed this issue also opposed a sunset provision on the mandatory nature of the standard, finding no good reason for any such provision.<sup>32</sup> Most of these parties also argued against (and no one argued for) setting a specific schedule whereby the Commission would review the standard, saying that any indication now of a need to modify the standard is premature and would be counterproductive to establishing the certainty that is required for the rapid implementation of digital television service. Many of these parties urged the Commission to rely on its existing processes and on industry groups like the ATSC for recommendations as to modifications to the standard.

Accordingly, the Commission should not adopt a sunset provision on the mandatory use of the standard and should not schedule any specific reviews, but should rely on industry organizations such as ATSC and on its existing processes to make any necessary modifications to the standard.

**VI. The ATSC DTV Standard Provides Far More Than Adequate Interoperability**

**A. Computer Interoperability**

In our initial comments, we described in detail the extensive efforts in the Advisory Committee to promote easy interoperability, saying that after these years of effort and tremendous progress, we're convinced that the ATSC DTV Standard provides *far more than adequate interoperability* with alternative media, that no critical interoperability problems

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<sup>32</sup>See, e.g., Broadcasters Comments (at 24), Thomson Comments (at 6), Zenith Comments (at 5), Tektronix Comments (at 3), MCEA Comments (at i, 4), MECA Comments (at 7), Hitachi America Comments (at 6), Sony Comments (at 36), EIA/ATV Comments (at ii, 10-12), ATSC Comments (at ii, 11-12), and ATTC Comments (at 5).

remain, and that the Commission need not take any further actions to facilitate interoperability. Here again, virtually all of the parties directly involved in the provision of terrestrial broadcast television service agree, but some parties less directly involved oppose various aspects of the standard, claiming they limit interoperability with computers.

The Broadcasters (at 7-8), urging the Commission to keep in mind its main goal -- the preservation and enhancement of free over-the-air TV, note that interoperability was emphasized from the beginning, and that the proposed standard excels in the areas of interoperability and compatibility. NTIA (at 2) praises the flexibility, interoperability and headroom for growth offered by the proposed standard, and AFCCE (at 2) says the interoperability aspects of the standard should satisfy even those non-TV industries clamoring for an inflexible standard based on a single scanning mode.

ATSC (at *ii*, 14-16) states that the standard is more interoperable by far than any other digital television system on the planet, and that the Commission need take no further action in this area. Thomson (at 8-10), Zenith (at 7-9), ATTC (at 2, 6), EIA/ATV (at 5), and Philips (at 8-9) make similar strong statements, with Philips noting a big payoff for NII applications that might be lost if further FCC delays mean that DVB becomes entrenched. General Instrument (at 6-8) gives an excellent discussion of the flexible capabilities of the standard and explains how the ATSC DTV Standard supports interoperability without limiting flexibility.

MECA (at 5-10) notes the standard's ability to enable a host of NII applications and its tremendous flexibility for future improvements, saying that interoperability is a matter of degree, and that the ATSC Standard strikes a balance that delivers interoperability unparalleled in the world. Hitachi America (at 4, 7) says that interoperability has been designed into the standard to a degree unprecedented in a universal service, noting the computer images that were included as part of the Advisory Committee tests.

Tektronix (at 6) argues that changes advocated by some in the computer industry are not in the public interest. Sony (at 3) states that critics of the standard offer nothing positive

and stubbornly ignore the grueling tests to which the system was subjected and the strong industry consensus around the result, saying these critics would deny the benefits of the proposed standard without offering a practical alternative. Sony (at 9-10) also states that first and foremost the standard is a television standard, and those who criticize virtually all primary technical parameters of the standard show either a profound lack of understanding of all that constitutes a television system, or a cynical and parochial dismissal of the critical priorities of the television industry. The ATSC Standard and the Grand Alliance system provide truly exemplary interoperability, but even so, interoperability debates almost by definition are destined to be interminable, and there is no rational technical resolution to this debate that can fully satisfy all factions. (Sony Comments at 35)

The Motion Picture Association of America ("MPAA") (at 4) says that the Advisory Committee proposal strikes the best balance between various technical considerations and the needs of different industries, and Universal Studios (at 2) endorses the MPAA comments regarding interoperability considerations. However, the Film Makers Coalition (at 2, 6) parrots the CICATS comments, saying that the Advisory Committee standard is not open and flexible and doesn't have headroom for future technologies.

The American Homeowners Foundation (at 2) states that some computer companies told them that the Advisory Committee proposals could add \$400 to the price of a personal computer to make it compatible with the Advisory Committee standard, but it would add very little if the CICATS approach were taken. Similarly, CFA/MAP (3-4) says that the Advisory Committee system provides for few, if any, changes, and that only the CICATS baseline standard is capable of convergence. They claim that consumers will have to buy two boxes, not one, because interlaced scanning, non-square pixel spacing, and low frame rates make convergence cost-prohibitive.

McKnight and Bailey (at 1) refer to receivers, VCRs and production equipment that use progressive scan as "interoperable," while any equipment using interlaced scan is called "noninteroperable," saying the standard will fail if it includes interlaced scanning.

Carver (at 2) says the proposed transmission is specific to television, and though it contains hooks for transporting alternative data, it departs greatly from state-of-the-art data transmission and communications practices -- a weakness that will surface to jeopardize the entire system.<sup>33</sup> Bove, *et al*, (at 3) say that the Grand Alliance standard is fatally flawed in its over-specificity and lack of extensibility.

Intel (at 3) says the proposed standard limits interoperability between computer and TV systems, and that the use of interlaced scanning, non-square pixels, and 60 Hz frame rates does not permit the use of graphic and textual images necessary for computer applications. Compaq (at *ii*, 3) says that the 18 formats with inferior technology (interlaced scanning, non-square pixels, computer unfriendly picture rates and limited aspect ratios) interfere with computer compatibility, while BSA (5) says ATSC DTV is incompatible with personal computer applications.

Demos (at 1,3) says the proposed system has complete incompatibility with computers. He quotes the prices of NTSC/PAL converters at \$50,000 to \$250,000 depending on quality, and more for HDTV conversion, concluding that the barriers against computer compatibility are practically insurmountable.<sup>34</sup>

These opposing comments make clear, as several parties warned, that the debate on computer interoperability is often characterized by absolute statements and hyperbole that shed no light at all on the real issues involved. Labeling progressive scan equipment "interoperable" and interlaced scan "noninteroperable" is a semantic ploy designed to win adherents simply by the advantageous choice of labels. And those who simply claim that a

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<sup>33</sup>We agree with Carver that the standard is focused primarily on television, but we strongly disagree that this is a weakness that will jeopardize the system. We believe that digital television service will be a powerful base upon which a host of other potential information services can flourish.

<sup>34</sup>Demos' conclusion is completely unfounded. Incredibly, he seems to be suggesting that it will cost \$50,000 or more to provide high-quality conversion of an interlaced DTV format for use on a progressive scan display. As we demonstrate later in these reply comments, high-quality de-interlacing in consumer receivers will impose modest costs initially for HDTV receivers, but these costs will become negligible by 2004 when significant market penetration will be achieved. For SDTV receivers, the incremental cost for high-quality de-interlacing will already be negligible when the transition to DTV begins.. Such gross exaggeration does little to inspire confidence in any of Demos' other estimates and claims.

standard that includes any interlaced scanning will surely fail, offer nothing but a bald assertion, and seem to ignore the fact that numerous *exclusively* interlaced digital television systems are thriving while we debate whether to permit four of the eighteen ATSC formats to be interlaced.

The absolute statements in these opposing comments, such as "not open and flexible," "doesn't have headroom for change," "provides for few if any changes," "is fatally flawed in its overspecificity and lack of extensibility," consumers will need two boxes," "only CICATS is capable of convergence," "incompatible with personal computer applications," and "does not permit use of graphics and textual images" are demonstrably false and can hardly convince the Commission of anything.

Another theme of these comments is also apparent. Various parties are being "told" false or misleading information about the interoperability issues surrounding the standard. As we show elsewhere in these comments, an estimate of \$400 to make a personal computer compatible with the standard is wildly unrealistic. Moreover, home owners might better inquire what cost-effective options they might lose if valuable capabilities are banned from the standard.

As we have explained before, the ATSC DTV Standard based on the Grand Alliance system is first and foremost a broadcast television system, but it also offers better interoperability with computers than any other digital television system ever conceived. It offers the maximum interoperability with computers possible without sacrificing its ability to fulfill its primary purpose and to provide *other* types of interoperability that are also important. For example, although it has virtually limitless ability to carry data, it is not and never was intended to be a general purpose data communications system, nor should it be.

#### **B. Progressive vs. Interlaced Scanning**

In our initial comments, we provided an extensive explanation of the role that the debate over progressive vs. interlaced scan played in the agreement to form the Grand Alliance and in the hard-won development of a strong industry consensus around the

Advisory Committee recommendation to include some interlaced formats in a predominantly progressive scan system. Most of the commenters directly involved in the provision of broadcast television service and equipment offer strong support for the Advisory Committee recommendation to include interlaced scanning formats, including many who fought hard to achieve a primarily progressive scan system. However, a number of other parties continue to register strong objections to the inclusion of any interlaced transmission formats.

As we stated in our initial comments, we believe that *interlaced scanning formats should not be prohibited*, and that any further debate on this issue ironically will serve only to entrench the many exclusively interlaced digital television systems that are rapidly being adopted in the U.S. and throughout the world.<sup>35</sup>

The 91 broadcasters and broadcast organizations who are among the primary users of the proposed standard (at 10-11), favor the inclusion of interlaced scanning, saying that far from detracting from the DTV Standard, inclusion of the interlaced format actually adds value. The Broadcasters state that "[t]he inclusion of interlaced scan as an option accommodates the interests of the broadcasters who favor it for some applications while still accommodating the needs of others in both broadcasting and computer and film industries that favor progressive technologies." MPAA (at 2), supported by Universal Studios (at 2), also endorses the inclusion of both progressive and interlaced transmission formats.

A wide range of other participants in the Advisory Committee process and other parties strongly endorse the Advisory Committee's recommendation to include some interlaced formats in what is predominantly a progressive scan transmission standard.

Thomson (at 10) and Zenith (at 10) argue that by supporting both progressive and interlaced scanning, the standard meets the needs of a broad range of different users. General Instrument (at 7) echoes this view, noting how the standard meets the special needs of the

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<sup>35</sup>Jae Lim of MIT, a member of the Grand Alliance, filed separate comments urging the Commission to adopt the proposed standard, but to eliminate interlaced scanning and non-square pixels from the SDTV formats. As we noted in our initial comments, although MIT supports all of the six Grand Alliance HDTV formats, MIT has opposed the inclusion of interlaced formats for SDTV in the ATV standard.